Allen-Bradley

MicroLogix 1500 programmable controller with Compact™ I/O for expansion

MicroLogix™ 1500 System Overview

Allen-Bradley
RELIANCE ELECTRIC
DODGE
ROCKWELL SOFTWARE

Rockwell Automation

Bringing Together Leading Brands in Industrial Automation

Take Control

Experience Complete Satisfaction With Allen-Bradley Products

Since 1903, Rockwell Automation's Allen-Bradley has earned a worldwide reputation as the most trusted brand name in industrial automation. It's a reputation built on a very simple strategy: providing customers with products of uncompromising quality and reliability. The MicroLogix 1500 family of controllers demonstrates that commitment to high standards of product dependability, technological innovation, and performance.

More importantly, because your absolute satisfaction is important to us, we back our products with the highest levels of customer service and support in the industry. Your local Rockwell Automation representative is your source for expert sales and order support, as well as:

- Product technical training
- Warranty support
- Service agreements

MicroLogix 1500 Controllers:

Expanding Your Choices for Greater Control

There was a time when a large controller was needed for applications requiring 100 or more points of I/O. Not any more. The MicroLogix 1500 is a more powerful and expandable addition to the MicroLogix family. This dynamic packaged controller can handle many applications that used to require larger, more expensive controllers.

World Class Features for Many Applications

The MicroLogix 1500 has more robust features than you might expect for a controller this size. It supports more than 7K of onboard non-volatile user memory to accommodate complex application programs. Additionally, the controller's terminal blocks are removable, "finger safe" NEMA-style blocks. And because it can be either DIN rail or panel mounted, the MicroLogix 1500 takes up a fraction of the space

of larger controllers while reducing overall application costs.

Communications are flexible for the MicroLogix 1500, as well. DH485 and DeviceNet™ compatibility are available via add-on communication modules, and DF1™ Full-Duplex and Half-Duplex Slave is perfect for SCADA applications. Ethernet® and ControlNet™ connectivity is available via a wide range of bridge products.

Finally, as with all MicroLogix controllers, the MicroLogix 1500 is programmed using the RSLogix 500™ programming environment. The instruction set is compatible with all MicroLogix as well as SLC controllers.

High-Speed Performance

Because many large manufacturing applications occur at a fast pace, the MicroLogix 1500 is built for speed. For example, the controller's typical scan time is less than 1 millisecond per 1K of user program. The MicroLogix 1500 likewise boasts two 20kHz high-speed counters, each with eight modes of operation, and two high-speed outputs that can be configured either as 20kHz Pulse Train Outputs (PTO) or as Pulse Width Modulation (PWM) outputs. Finally, you will find one selectable timed interrupt (STI) and four event interrupts, making the MicroLogix 1500 ideal for many high-speed applications.

Application Flexibility through Compact I/O

The magic behind the MicroLogix 1500 is its use of Compact I/O, a new "PLC-style" I/O platform, for I/O expansion. Compact I/O makes use of the latest design technology for superior performance and ease of use while maintaining the MicroLogix 1500's small footprint.

Expandable up to 128 I/O points, Compact I/O features an innovative rackless design, reducing overall system cost. Its modular, high-density configuration reduces panel space requirements. And because modules can be added or replaced from the front of the unit, installation and maintenance time is significantly reduced.

Compact I/O offers broad application coverage via 24VDC sink/source and 120/240VAC I/O, relay, and analog I/O.

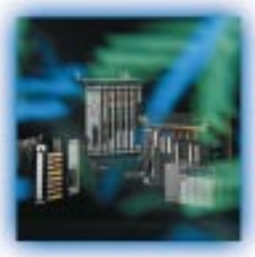


Table of Contents

Refer to the MicroLogix Selector Guide on the back cover of this publication for assistance in selecting the correct MicroLogix Programmable Controller for your application.

Inside... **Page**

MicroLogix 1500 System 5

Expansion I/O Modules 8

Expansion Power Supplies and Cables 13

Communication Choices. 15

Network Interface Devices 18

High-Speed Functions 21

Programming Software 22

Programming Instructions 24

Operator Interface Devices 25

Accessories 26

User Documentation 28

Dimensions. 29

MicroLogix 1500 System

The MicroLogix 1500 is a completely new packaged controller platform with world-class features and performance. Many of these new features allow this packaged controller to be used in applications where much larger controllers were required in the past.

The MicroLogix 1500 controller features an innovative two-piece design with a small footprint. The processor and base slide together to form the complete controller unit. The processor is independently replaceable from the base, allowing you to maximize your embedded I/O options while minimizing inventory stocking costs. An independently replaceable processor unit also means replacements can be made without disturbing existing wire connections.

The MicroLogix 1500 uses Compact™ I/O, a high-performance modular and rackless design that provides front access, removal and insertion for lower system cost and reduced parts inventory.

And, the MicroLogix 1500 system also utilizes Rockwell Software RSLogix 500™ programming software and features a common instruction set to the MicroLogix 1000, MicroLogix 1200 and SLC families of controllers.

A flash upgradeable operating system makes it easy to upgrade operating systems without having to replace hardware.

Program portability allows user programs to be uploaded, downloaded and transported via Memory Modules. Real-Time Clock (RTC) capabilities allow time scheduling of control.

The optional Data Access Tool (DAT) plug-in device offers you the ability to digitally monitor and adjust 48 integer and 48 bit locations. Two additional

Features:

- Large user memory
  - Greater than 7K user memory (catalog number 1764-LSP)
  - 12K user memory (catalog number 1764-LRP)(1)
- 32-bit signed integer math
- Embedded I/O, providing enhanced high-speed inputs and output
- Three base options, including a choice of electrical configurations featuring:
  - ac or dc inputs
  - ac or dc power
  - relay or solid-state outputs
- Two analog trim potentiometers built into the controller. A 3/4 turn adjusts an integer between 0 and 250
- Built-in PID capabilities
- Two high-speed outputs that can be configured as 20 kHz PTO (Pulse train Outputs), or as PWM (Pulse Width Modulated) outputs with acceleration/deceleration profiles(1)
- Additional RS-232 communication port, allowing programming access to the controller, while connected to other devices or networks (catalog number 1764-LRP)(1)
- Data file download protection, saving critical user data from being overwritten during logic transfers
- Static data file protection, preventing user data from being altered via communication(1)
- ASCII read/write capability with string file type (1)
- Data logging instruction stores up to 50K of data records

(1) Planned availability in April 2000. Contact your local Rockwell Automation representative for information.

Base Unit General Specifications

Description	1764-24BWA	1764-24AWA	1764-28BXB
Number of I/O	12 inputs 12 outputs		16 inputs 12 outputs
Line Power	85/265V ac		20.4 to 30V dc
Power Supply Max Inrush	120V ac = 25A for 8 ms 240V ac = 40A for 4 ms		24V dc = 4A for 150 ms
User Power Output	24V dc at 400 mA, 400 µf max.	None	
Input Circuit Type	24V dc, sink/source	120V ac	24V dc, sink/source
Output Circuit Type	Relay		6 Relay 6 FET transistor
Operating Temp.	+0°C to +55°C (+32°F to +131°F) ambient		
Operating Humidity	5% to 95% relative humidity (non-condensing)		
Vibration	Operating: 10 to 500 Hz, 5G, 0.015 in. peak-to-peak Relay Operation: 2G		
Shock (without Data Access Tool installed)	Operating: 30G panel mounted (15G DIN Rail mounted) Relay Operation: 7.5G panel mounted (5G DIN Rail mounted) Non-Operating: 40G panel mounted (30G DIN Rail mounted)		
Shock (with Data Access Tool installed)	Operating: 20G panel mounted (15G DIN Rail mounted) Relay Operation: 7.5G panel mounted (5G DIN Rail mounted) Non-Operating: 30G panel mounted (20G DIN Rail mounted)		
Agency Certification	UL 508 C-UL under CSA C22.2 no. 142 Class I, Div. 2, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 no. 213) CE compliant for all applicable directives		
User Manual	MicroLogix 1500 Programmable Controllers User Manual, publication 1764-6.1		

Base Unit Input Specifications

Description	1764-24AWA	1764-24BWA and 1764-28BXB	
		Inputs 0 thru 7	Inputs 8 and Higher
On-State Voltage Range Operating Voltage Range	79 to 132V ac	14 to 30.0 V dc at 30°C (86°F) 14 to 26.4 V dc at 55°C (131°F)	10 to 30.0 V dc at 30°C (86°F) 10 to 26.4 V dc at 55°C (131°F)
Operating Frequency	47 Hz to 63 Hz	0 Hz to 20 KHz (1764-24BWA)	0 Hz to 1 KHz(1) (1764-24BWA)
On-State Current: • minimum • nominal • maximum	• 5.0 mA at 79V ac • 12.0 mA at 120V ac • 16.0 mA at 132V ac	• 2.5 mA at 14V dc • 7.3 mA at 24V dc • 12.0 mA at 30V dc	• 2.0 mA at 10V dc • 8.9 mA at 24V dc • 12.0 mA at 30V dc
Off-State Leakage Current	2.5 mA minimum	1.5 mA minimum	
Nominal Impedance	12K Ω at 50 Hz 10K Ω at 60 Hz	3.3K Ω	2.7K Ω
Inrush Current (max.) at 120V ac	250 mA	Not Applicable	Not Applicable

(1) Scan-time dependent.

Relay Contact Rating Table 1764-24AWA, -24BWA, -28BXB

Maximum Volts	Amperes		Amperes Continuous	Voltamperes	
	Make	Break		Make	Break
240V ac	7.5A	0.75A	2.5A	1800VA	180VA(2)
120V ac	15A	1.5A			
125V dc	0.22A(1)		1.0A	28VA	
24V dc	1.2A[1]		2.0A	28VA	

(1) For dc voltage applications, the make/break ampere rating for relay contacts can be determined by dividing 28 VA by the applied dc voltage. For example, 28 VA/48V dc = 0.58A. For dc voltage applications less than 14V, the make/break ratings for relay contacts cannot exceed 2A.
(2) The total load controlled by the 1764-24AWA and 1764-24BWA is limited to 1440VA (break).

Output Specifications - Maximum Continuous Current

Specification		1764-24AWA/BWA	1764-28BXB
Current per Common		8A	8A
Current per Controller	at 150V ac Maximum	24A	18A
	at 240V ac Maximum	20A	18A

1764-28BXB FET Output Specifications

Specification		General Operation (Outputs 2 thru 7)	High-Speed Operation(1) (Outputs 2 and 3 Only)
User Supply Voltage	Minimum	20.4V dc	20.4V dc
	Maximum	26.4V dc	26.4V dc
Current Rating per Point	Maximum load	1A at 55°C (131°F) 1.5A at 30°C (86°F)	100 mA
Surge Current per Point	Peak current	4.0A for 10 msec	Not Applicable
Current per Common	Maximum total	6A	6A
Off to On Response	Maximum	0.1 msec	6 µsec
On to Off Response	Maximum	1.0 msec	18 µsec

(1) Outputs 2 and 3 are designed to provide increased functionality over the other FET outputs (4 through 7). They may be used like the other FET transistor outputs, but in addition, within a limited current range, they may be operated at a higher speed. Outputs 2 and 3 also provide a pulse train output (PTO) or pulse width modulation output (PWM) function.

Expansion I/O Modules

High-density Bulletin 1769 Compact I/O rackless expansion modules offer superior functionality and high value at a competitive price. With a variety of modules, they complement and extend the capabilities of the MicroLogix 1500 controller by maximizing flexibility of the I/O count and type. (Up to eight expansion Compact I/O modules can be connected to a MicroLogix 1500 controller.) Compact I/O provides an excellent platform for future enhancements, so you can easily choose the level of control as your application needs grow.

Compact I/O's analog modules provide 14-bit plus sign maximum resolution, making them an excellent choice in applications where the need to detect small changes in the analog input is vital.

Similarly, Compact I/O analog modules can be used in applications where accuracy is crucial. The modules share a high accuracy rating of ±0.35% of full-scale accuracy in the current mode. In the voltage mode, the 1769-IF4 provides ±0.2 and the 1769-OF2 ±0.5% of full-scale accuracy at 25°C.

Features:

- Modular system, allowing mixing modules to suit the application
- Feature-rich I/O functionality to address a wide range of applications
- Rackless design, eliminating added system costs and inventory
- Small footprint, shrinking panel space requirements
- Front insertion and removal, reducing assembly and replacement time
- Unique tongue-and-groove interlocking case design, ensuring a strong, mechanical connection between modules
- Integral high-performance I/O bus
- Software keying, preventing incorrect positioning within the system
- Analog I/O, AC/DC relay, 24V dc, and 120/240V ac voltages

Currently available modules include:

1769-IA16	16-point 120V ac Input Module
1769-IA8I	8-point Individually Isolated 120V ac Input Module
1769-OA8	8-point 120/240V ac Output Module
1769-IM12	12-point 240V ac Input Module
1769-IQ16	16-point 24V dc Sinking/Sourcing Input Module
1769-OB16	16-point 24V dc Sourcing Output Module
1769-OV16	16-point 24V dc Sinking Output Module
1769-OW8	8-point ac/dc Relay Output Module
1769-OW8I	8-point Individually Isolated ac/dc Relay Output Module
1769-IQ6XOW4	Combination 6-point dc Input and 4-point Relay Output Module
1769-IF4	4-channel analog current/voltage Input Module
1769-OF2	2-channel analog current/voltage Output Module

Discrete Input Specifications

Specification	1769-IM12	1769-IA16	1769-IQ16	1769-IA8I
Voltage Category	200/240V ac	100/120V ac	24V dc (sink/source)	100/120V ac
Voltage Range	159 to 265V ac at 47 Hz to 60 Hz	79 to 132V ac at 47 Hz to 63 Hz	10 to 30V dc at 30°C (86°F) 10 to 26.4V dc at 60°C (140°F)	79V ac to 132V ac at 47 Hz to 63 Hz
Number of Inputs	12	16	16	8
Number of Commons per Module	2(1)	2(1)	2	8
On-State Voltage (min.)	159V ac	79V ac	10V dc	79V ac
Off-State Voltage (max.)	40V ac	20V ac	5V dc	20V ac
On-State Current (min.)	5.0 mA min. at 159 V ac 8.0 mA nominal at 230V ac	5.0 mA (min.) at 79V ac 12 mA (nominal) at 120V ac	2.0 mA at 10V dc 8.0 mA nominal at 24V dc	5.0 mA at 79V ac
Off-State Leakage Current (max.)	2.5 mA	2.5 mA	1.5 mA	2.5 mA
Inrush Current (max.)	250 mA(2)	205 mA(3)	250 mA	250 mA(3)
Nominal Impedance	27K Ω at 50 Hz 23K Ω at 60 Hz	12K Ω at 50 Hz 10K Ω at 60 Hz	3K Ω	12K Ω at 50 Hz 10K Ω at 60 Hz
Signal Delay	On Delay: 20 ms max. Off Delay: 20 ms max.		On Delay: 8 ms max. Off Delay: 8 ms max.	
Input Compatibility	IEC Type 1+			
Bus Current Draw	100 mA at 5V dc (0.500W)	115 mA at 5V dc (0.575W)		90 mA at 5V dc (0.45W)
Power Supply Distance Rating	8 (The maximum distance an I/O module may be located from the power supply is 8 modules.)			
Input Group to Bus Isolation	1836V ac for 1 sec. or 2596V dc for 1 sec. 265V ac working voltage (IEC Class 2 reinforced insulation)	1517V ac for 1 sec. or 2145V dc for 1 sec. 132V ac working voltage (IEC Class 2 reinforced insulation)	1200V ac for 1 sec. or 1697V dc for 1 sec. 75V dc working voltage (IEC Class 2 reinforced insulation)	1517V ac for 1 sec. or 2145V dc for 1 sec. 132V ac working voltage (IEC Class 2 reinforced insulation)

(1) This module has two internally connected common terminals.

(2) A current limiting resistor can be used to limit inrush current; however, the operating characteristics of the ac input circuit will be affected. If a 15K Ω (1.5W minimum) resistor is placed in series with the input, the inrush current is reduced to 35 mA. In this configuration the minimum on-state voltage increases to 176V ac. Before adding the resistor in a hazardous environment, be sure to consider the operating temperature of the resistor and the temperature limits of the environment. The operating temperature of the resistor must remain below the temperature of the environment.

(3) A current limiting resistor can be used to limit inrush current; however, the operating characteristics of the ac input circuit will be affected. If a 6.8K Ω (2.5W minimum) resistor is placed in series with the input, the inrush current is reduced to 35 mA. In this configuration the minimum on-state voltage increases to 92V ac. Before adding the resistor in a hazardous environment, be sure to consider the operating temperature of the resistor and the temperature limits of the environment. The operating temperature of the resistor must remain below the temperature of the environment.

Discrete Output Specifications

Specification	1769-OA8	1769-OB16	1769-OV16	1769-OW8	1769-OW8I
Voltage Category	100 to 240V ac	24V dc		AC/DC normally open relay	
Operating Voltage Range	85 to 265V ac at 47 to 63 Hz	20.4 to 26.4V dc (source)	20.4 to 26.4V dc (sink)	5 to 265V ac 5 to 125V dc	
Number of Outputs	8	16		8	
Number of Commons per Module	2	1	1	2	8
Bus Current Draw (max.)	145 mA at 5V dc (0.725W)	200 mA at 5V dc (1.0W)		125 mA at 5V dc (0.625W) 100 mA at 24V dc (2.4W)	
Heat Dissipation(1)	2.12 Total Watts	2.11 Total Watts	2.06 Total Watts	2.83 Total Watts	
Off-State Leakage (max.)	2.0 mA at 132V ac 2.5 mA at 265V ac	1.0 mA at 26.4V dc(2)	1.0 mA at 26.4V dc(2)	0 mA	
Continuous Current per Point (max.)	0.25A at 60°C (140°F) 0.5A at 30°C (86°F)	0.5A at 60°C (140°F) 1.0A at 30°C (86°F)		2.5A	
Continuous Current per Common (max.)	n/a			8A	2.5A
Continuous Current Per Module (max.)	2.0 A at 60°C (140°F) 4.0 A at 30°C (86°F)	4.0A at 60°C (140°F) 8.0A at 30°C (86°F)		16A	
Surge Current (max.)	10.0A (Repeatability is once every 2 seconds for a duration of 25 msec.)(3)	2.0A (Repeatability is once every 2 seconds for a duration of 10 msec.)(4)		n/a	
Power Supply Distance Rating	8 (The maximum distance an I/O module may be located from the power supply is 8 modules.)				
Output Group to Bus Isolation	1836V ac for 1 sec. or 2596V dc for 1 sec. 265V ac working voltage (IEC Class 2 reinforced insulation)	1200V ac for 1 sec. or 1697V dc for 1 sec. 75V dc working voltage (IEC Class 2 reinforced insulation)		1836V ac for 1 sec. or 2596V dc for 1 sec. (IEC Class 2 reinforced insulation)	

(1) The maximum heat in Watts generated by an I/O module with all points energized.

(2) **Typical Loading Resistor -** To limit the effects of leakage current through solid state outputs, a loading resistor can be connected in parallel with your load. Use a 5.6K ohm, ½ watt resistor for transistor outputs, 24V dc operation.

(3) **Surge Suppression** - Connecting surge suppressors across your external load extends the life of the triac outputs. For additional details, refer to *Industrial Automation Wiring and Grounding Guidelines*, Allen-Bradley publication 1770-4.1.

(4) **Recommended Surge Suppression** - Use a 1N4004 diode reverse-wired across the load for transistor outputs switching 24V dc inductive loads. For additional details, refer to *Industrial Automation Wiring and Grounding Guidelines*, Allen-Bradley publication 1770-4.1.

n/a = not applicable

1769-IQ6XOW4 Input and Output Specifications

Specifications	1769-IQ6XOW4
Voltage Category	24V dc (sink/source) inputs AC/DC normally open relay outputs
Operating Voltage Range	inputs: 10 to 30V dc at 30°C (86°F) inputs: 10 to 26.4V dc at 60°C (140°F) outputs: 5 to 265V ac outputs: 5 to 125V dc
Number of Inputs	6
Number of Outputs	4
Number of Commons per Module	2 (one for inputs, one for outputs)
Bus Current Draw (max.)	105 mA at 5V dc (0.525W); 50 mA at 24V dc (1.200W)
Heat Dissipation	2.75 Total Watts
Nominal Impedance	3K Ω (inputs)
IEC Input Compatibility	Type 1+ (inputs)
Signal Delay (max.) - resistive load	turn-on = 10 ms; turn-off = 10 ms (outputs)
On-State Current (min.)	10 mA at 5V dc (outputs)
Continuous Current per Point (max.)	2.5A (outputs)
Continuous Current per Common (max.)	8A (outputs)
Power Supply Distance Rating	8 (The maximum distance an I/O module may be located from the power supply is 8 modules.)
Input Group to Bus Isolation	1200V ac for 1 sec. or 1697V dc for 1 sec. 75V dc working voltage (IEC Class 2 reinforced insulation)
Output Group to Bus Isolation	1836V ac for 1 sec. or 2596V dc for 1 sec. 265V ac working voltage (IEC Class 2 reinforced insulation)

Analog I/O Modules

Compact I/O offers two analog I/O choices:

- 1769-IF4 - 4-channel current or voltage input
- 1769-OF2 - 2-channel current or voltage output

Each channel on both the 1769-IF4 and 1769-OF2 modules has the ability to be individually configured for either analog current (4 to 20 mA or 0 to 20 mA) or voltage (±10V dc, 0 to 10V dc, 0 to 5V dc or 1 to 5V dc) input/output. This provides application flexibility, reduces stock inventory and lessens the learning curve.

1769-IF4 Input Specifications

Specification	1769-IF4
Analog Normal Operating Ranges	Voltage: ±10V dc, 0 to 10V dc, 0 to 5V dc, 1 to 5V dc Current: 0 to 20 mA, 4 to 20 mA
Number of Inputs	4 differential or single-ended
Bus Current Draw (max.)	120 mA at 5V dc, 150 mA at 24V dc (2.4 W)
Resolution (max.)	14 bits minimum (unipolar) 14 bits plus sign (bipolar), with 50 or 60 Hz filter selected
Normal Mode Rejection Ratio	Voltage: -10 dB at 50 Hz, -12 dB at 60 Hz Current: -15 dB at 50 Hz, -18 dB at 60 Hz
Input Impedance	Voltage Terminal: 200K Ω, Current Terminal: 250 Ω
Overall Accuracy(1)	Voltage Terminal: ±0.2% full scale at 25°C Current Terminal: ±0.35% full scale at 25°C
Non-linearity (in percent full scale)	±0.03%
Repeatability(2)	±0.03%
Module Error over Full Temperature Range (0 to +60°C [+32°F to +140°F])	Voltage: ±0.3% Current: ±0.5%
Input Channel Configuration	Via configuration software screen or the user program.
Field Input Calibration	Not required
Channel Diagnostics	Over- or under-range by bit reporting
Power Supply Distance Rating	8 (The maximum distance an I/O module may be located from the power supply is 8 modules.)
Input Group to Backplane Isolation	Verified by one of the following dielectric tests: 1200V ac for 1 sec. or 1697V dc for 1 sec. 50V ac/75V dc working voltage (IEC Class 2 reinforced insulation)

(1) Includes offset, gain, non-linearity and repeatability error terms.
(2) Repeatability is the ability of the input module to register the same reading in successive measurements for the same input signal.

1769-OF2 Output Specifications

Specification	1769-OF2
Analog Ranges	Voltage: ±10V dc, 0 to 10V dc, 0 to 5V dc, 1 to 5V dc Current: 0 to 20 mA, 4 to 20 mA
Number of Outputs	2 single-ended
Bus Current Draw (max.)	120 mA at 5V dc, 200 mA at 24V dc
Conversion Rate (all channels) max.	2.5 ms
Step Response to 63%(1)	2.9 ms
Current Load on Voltage Output	5 mA max.
Resistive Load on Current Output	0 to 500 Ω (includes wire resistance)
Load Range on Voltage Output	> 1k Ω at 5V dc > 2k Ω at 10V dc
Max. Inductive Load (Current Outputs)	0.1 mH
Max. Capacitive Load (Voltage Outputs)	1 µF
Field Calibration	None required
Overall Accuracy(2)	Voltage Terminal: ±0.5% full scale at 25°C, Current Terminal: ±0.35% full scale at 25°C
Non-linearity (in percent full scale)	±0.05%
Repeatability(3) (in percent full scale)	±0.05%
Output Error Over Full Temperature Range (0 to 60°C [32 to +140°F])	Voltage: ±0.8% Current: ±0.55%
Open and Short-Circuit Protection	Yes
Output Overvoltage Protection	Yes
Channel Diagnostics	Over-or-under range by bit reporting output wire broken or load resistance high by bit reporting (current mode only)
Power Supply Distance Rating	8 (The maximum distance an I/O module may be located from the power supply is 8 modules.)
Output Group to Backplane Isolation	Verified by one of the following dielectric tests: 1200V ac for 1 sec. or 1697V dc for 1 sec. 50V ac/50V dc working voltage (IEC Class 2 reinforced insulation)

(1) Step response is the period of time between when the D/A converter was instructed to go from minimum to full range until the device is at 63% of full range.
(2) Includes offset, gain, non-linearity and repeatability error terms.
(3) Repeatability is the ability of the output module to reproduce output readings when the same controller value is applied to it consecutively, under the same conditions and in the same direction.

Expansion Power Supplies and Cables

Using an expansion I/O power supply increases the system's capacity for adding expansion I/O modules, such as the 1769-IF4 and 1769-OF2 analog modules.

You can visit the MicroLogix web site to obtain an electronic worksheet to assist you with system expansion validation using 1769 power supplies and Bus communication cables. On the Internet, go to http://www.ab.com/micrologix. Enter MicroLogix 1500; go to Tools and Tips, Expansion I/O System Qualifier.

MicroLogix 1500 System Expansion

With MicroLogix 1500 Operating System Revision Number (FRN) 3 or later, you can now connect an additional bank of I/O to your controller.

In a MicroLogix 1500 system, a maximum of one 1769 Expansion cable can be used, allowing for two banks of I/O modules (one connected directly to the controller, and the other connected via the cable). Each I/O bank(1) requires its own power supply (Bank 0 uses the controller's embedded power supply).

Only one power supply (embedded or expansion) may be used on an I/O bank. The expansion power supply cannot be connected directly to a controller that has an embedded power supply, such as the MicroLogix 1500. It must be connected using one of the expansion cables. (See photos on page 14.)

Checking the MicroLogix 1500 Firmware

To use the MicroLogix 1500 controller with a 1769 Expansion I/O power supply, verify that you have the following:

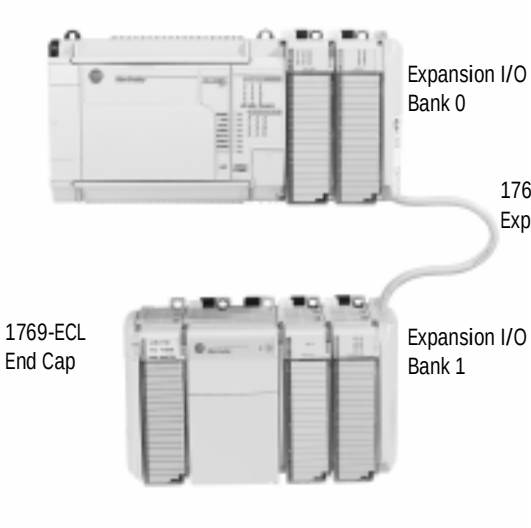
- MicroLogix 1500 Processor (Catalog Number 1764-LSP, Series A, Revision C or higher)
- Operating System Version: Firmware Revision Number (FRN) 3 or higher

You can check the FRN by looking at word S:59 (Operating System FRN) in the status file.

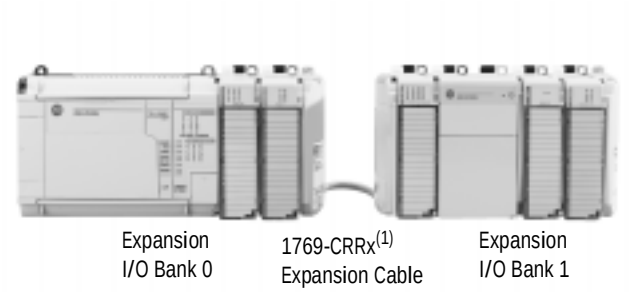
If your processor is at an older revision, you must upgrade the operating system to FRN 3 or higher to use an expansion cable and power supply. On the internet, go to http://www.ab.com/micrologix to download the operating system upgrade. Enter MicroLogix 1500; go to Tools and Tips.

(1) An I/O bank is a group of I/O modules connected directly to one another. Banks are separated by cables.

Vertical Orientation



Horizontal Orientation



(1) The x in this catalog number can be either a 1 or a 3 representing the length of the cable: 1 = 1 foot (305 mm) and 3 = 3.28 feet (1 meter).

Expansion Power Supplies Specifications

Specification	1769-PA2	1769-PB2
Dimensions	118 mm (height) x 87 mm (depth) x 70mm (width); height including mounting tabs is 138 mm. 4.65 in. (height) x 3.43 in (depth) x 2.76 in (width); height including mounting tabs is 5.43 in.	
Storage Temperature	-40°C to +85°C (-40°F to +185°F)	
Operating Temperature	0°C to +60°C (32°F to +140°F)	
Operating Humidity	5% to 95% non-condensing	
Power Supply Distance Rating	8 (The maximum distance an I/O module may be located from the power supply is 8 modules.)	
Agency Certification	C-UL certified (under CSA C22.2 No. 142) UL 508 listed CE compliant for all applicable directives	
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)	
Nominal Supply Voltage	120/240V ac (no jumpers)	24V dc
Voltage Range	85 to 265V ac (no jumper or DIP switch required) 47 to 63 Hz	19.2 to 31.2V dc
Maximum Line Requirement	100 VA at 120V ac 130 VA at 240V ac	50 VA at 24V dc
Maximum Inrush	25A at 132V ac 40A at 265V ac	30A at 31.2V dc
Short Circuit Protection	Front Access Fuse (Replacement part number: Wickmann 19195-3.15A Wickmann 19343-1.6A, or Wickmann 19181-4A)	Front Access Fuse (Replacement part number: Wickmann 19193-6.3A)
+5V Overvoltage Protection	Yes	
+24V Overvoltage Protection	Yes	
+24V dc User Voltage Range	20.4V dc to 26.4V dc	NA

Expansion Cable Specifications

Specification	
Operating Temperature	0°C to +60°C (32°F to +140°F)
Operating Humidity	5% to 95% non-condensing
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)

Communication Choices

All MicroLogix 1500 programmable controllers provide several communication options to fit into a variety of applications.

The addition of a second full-function RS-232 communications port (catalog number 1764-LRP)(1) enables two communication devices to be connected to the controller simultaneously (e.g. ASCII device, operator interface device, modem or programming device).

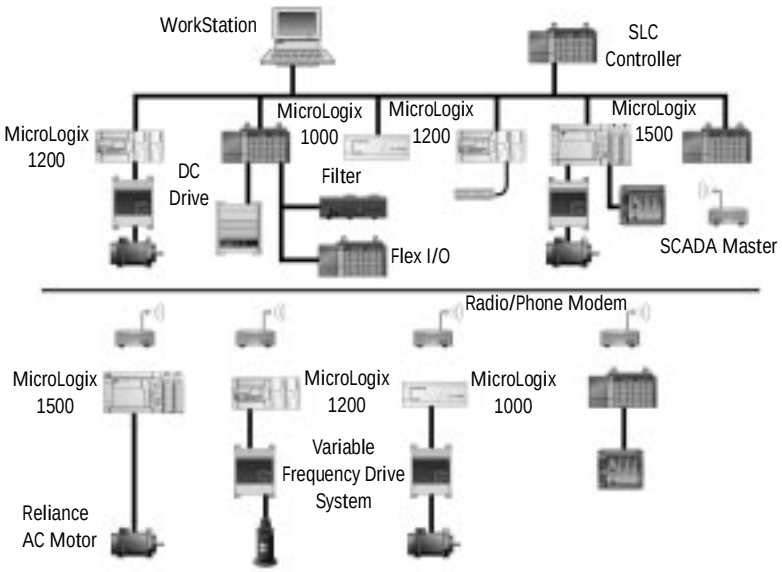
The DF1 Full-Duplex protocol allows the MicroLogix 1500 to communicate directly with another device, such as a personal computer or an operator interface device. The DF1 Full-Duplex protocol (also referred to as DF1 point-to-point protocol) is useful where RS-232 point-to-point communication is required.

The DH485 multi-drop communication capability allows you to network up to 32 MicroLogix or SLC 500 controllers, Human/Machine Interface (HMI) devices and/or personal computers using peer-to-peer messaging.

And, the MicroLogix 1500 can communicate on a DeviceNet network as well. DeviceNet digitally links push buttons, sensors, actuators, PLCs and other industrial devices on an open network.

MicroLogix 1500 controllers also support DF1 Half-Duplex Slave communications for use in SCADA systems as a Remote Terminal Unit (RTU). This open network protocol enables MicroLogix controllers to communicate as responder (slave) nodes on DF1 master/slave networks. DF1 supports up to 254 responder devices with a single master.

Additionally, the MicroLogix 1500 supports Modbus Slave, a SCADA/RTU protocol(1).



Features:

- One RS-232 port (available on all base units)
- Additional RS-232 port (available when using catalog number 1764-LRP)(1)
- 300, 600, 1200, 4800, 9600, 19,200, and 38,400 baud rates
- RTS/CTS Hardware handshake signals - channel 0
- RTS/CTS/DCD Hardware handshake signals - channel 1(1)
- Connection to DH485 and DeviceNet networks through 1761-NET-AIC and 1761-NET-DNI, respectively
- Connection to modems for remote communications
- ASCII messaging provides dial-out capability(1)

The MicroLogix 1500 allows you to choose the network that best meets your needs.

If your application requires:	Use this network
• Connection of low-level multi-vendor devices directly to plant floor controllers • Data sharing between 64 devices • Better diagnostics for improved data collection and fault detection • Less wiring and reduced start-up time than traditional, hard-wired systems	DeviceNet via the 1761-NET-DNI
• Plant-wide and cell-level data sharing with program maintenance • Data sharing between 32 controllers • Program upload, download, and monitoring to all controllers • Compatibility with multiple Allen-Bradley HMI devices	DH485 via the 1761-NET-AIC
• Connection to dial-up modems for remote program maintenance or data collection • Connection to leased-line or radio modems for use in SCADA systems • Remote Terminal Unit (RTU) functions	DF1 Full-Duplex DF1 Half-Duplex Slave
• Connection to modems for remote data collection in a SCADA system • Remote Terminal Unit (RTU) functions	Modbus RTU Slave(1)

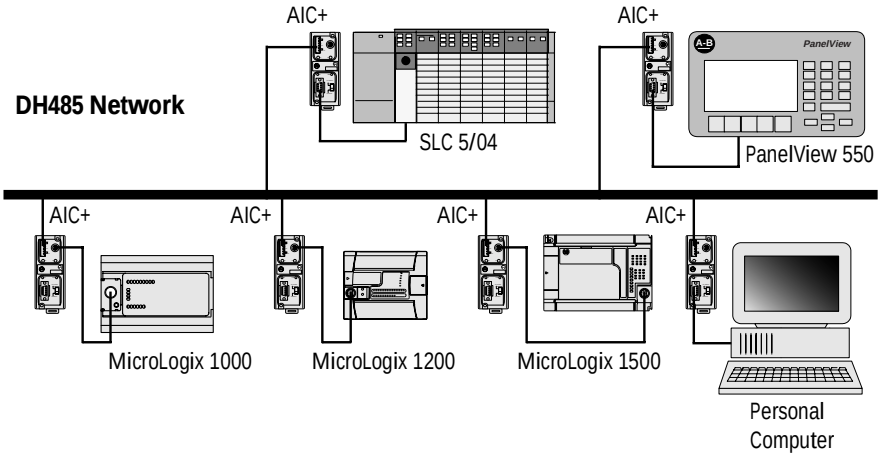
(1) Planned availability in April 2000. Contact your local Rockwell Automation representative for information.

Local Messages

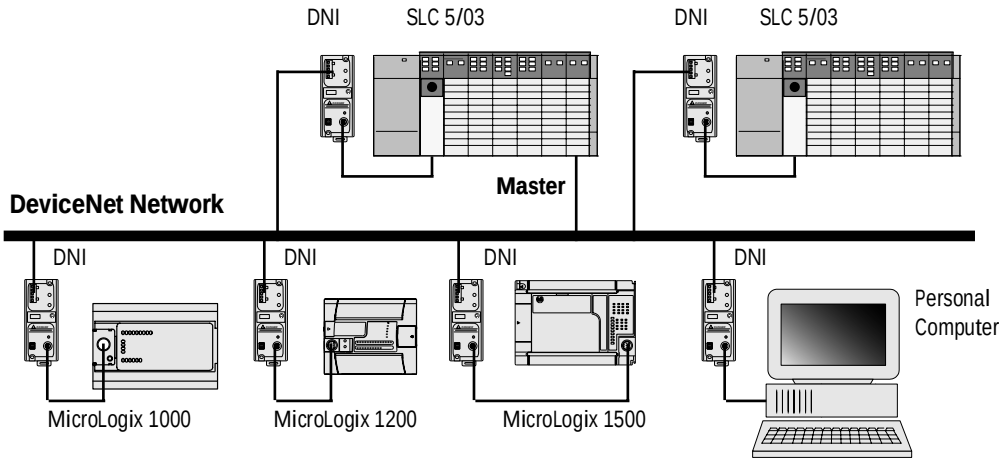
The MicroLogix 1500 is capable of communicating using local or remote messages. With a local message, all devices are accessible without a separate device acting as a bridge. Remote messages use a remote network, where devices are accessible only by passing or routing through a device.

The following four examples represent different types of local and remote networks.

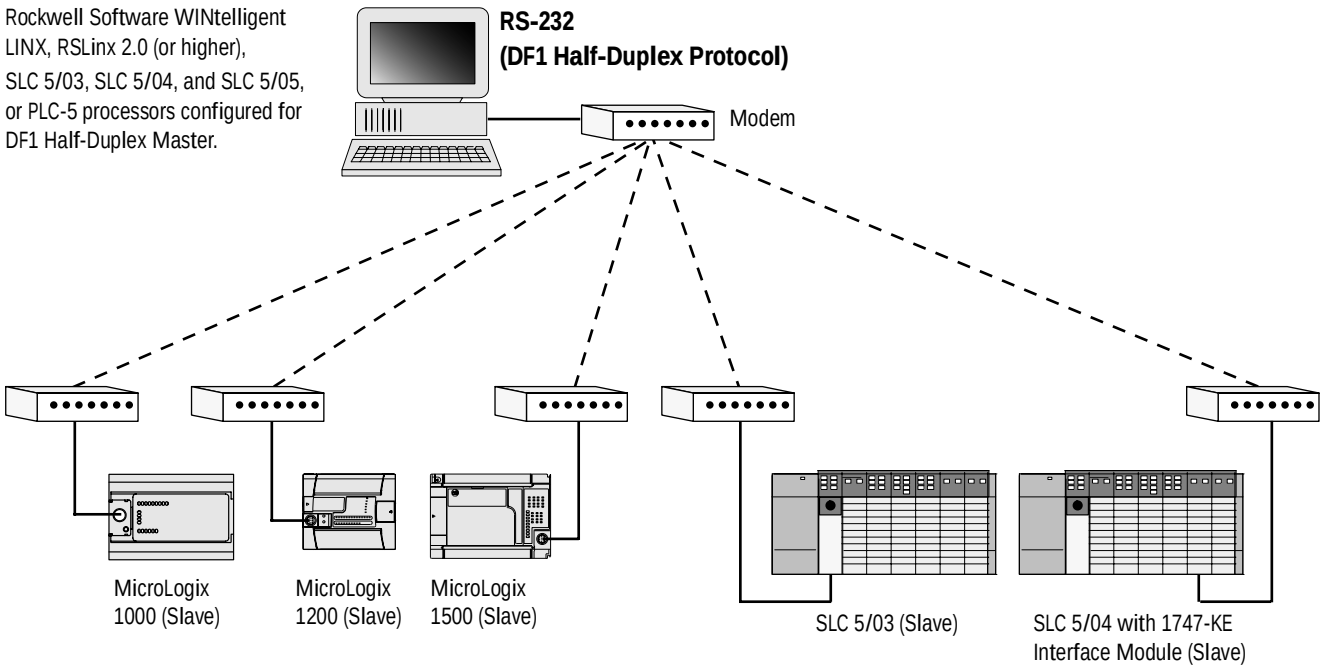
Example 1 - Local DH485 Network with AIC+ (1761-NET-AIC) Interface



Example 2 - Local DeviceNet Network with DeviceNet Interface (1761-NET-DNI)

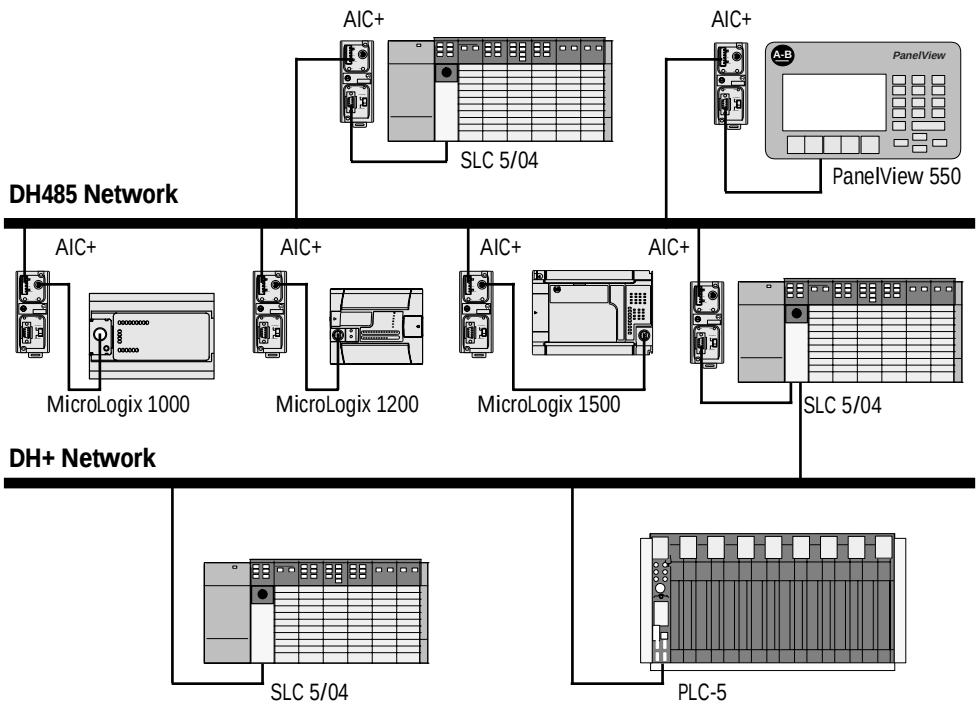


Example 3 - Local DF1 Half-Duplex Network


Rockwell Software WINtelligent LINX, RSLinx 2.0 (or higher), SLC 5/03, SLC 5/04, and SLC 5/05, or PLC-5 processors configured for DF1 Half-Duplex Master.
RS-232
(DF1 Half-Duplex Protocol)
Modem
MicroLogix 1000 (Slave)
MicroLogix 1200 (Slave)
MicroLogix 1500 (Slave)
SLC 5/03 (Slave)
SLC 5/04 with 1747-KE Interface Module (Slave)

NOTE It is recommended that isolation (1761-NET-AIC) be provided between the controller and the modem when using a non-isolated port.

Example 4 - Remote Messaging



Network Interface Devices

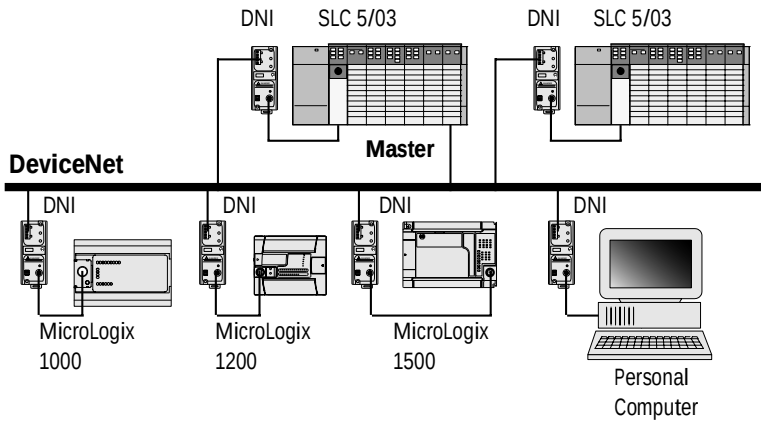
The Micrologix 1500 Programmable Controller's list of impressive hardware, memory, and processing features makes this family of controllers an ideal choice for mid-sized applications. Additionally, with the 1761-NET-DNI DeviceNet Interface and 1761-NET-AIC Advanced Interface Converter (AIC+), you can connect MicroLogix Programmable Controllers to DH485 and DeviceNet networks.

For detailed information on using the network interface modules, refer to the *DeviceNet™ Interface User Manual*, publication 1761-6.5, and the *AIC+ Advanced Interface Converter User Manual*, publication 1761-6.4. To purchase these manuals or download a free electronic version, visit us at http://www.theautomationbookstore.com. For fast access to related publications, visit the MicroLogix Internet site http://www.ab.com/micrologix. Electronic versions of our manuals are available for you to search and download.

1761-NET-DNI DeviceNet Interface Module

Highlights of the DeviceNet Interface's capabilities are:

- Peer-to-peer messaging between Allen-Bradley controllers and other devices using the DF1 Full-Duplex protocol
- Programming and on-line monitoring over the DeviceNet network
- With a DNI connected to a modem, you can dial in to any other DNI-controller combination on DeviceNet
- Other DeviceNet products can send explicit (Get or Set) messages with the DNI at any time
- The controller can initiate an explicit message to any UCMM (Unconnected Message Manager) compatible device on DeviceNet



MicroLogix micro-PLCs extend the benefits of distributed control to the device level of your process with the addition of DeviceNet functionality.

DeviceNet digitally links push buttons, sensors, actuators, PLCs and other industrial devices. It reduces the installation and maintenance costs of multiple discrete wires with a single cable that handles both communications and power distribution.

The 1761-NET-DNI Series B Interface (DNI) brings the fast response, low cost and reliability of open DeviceNet connectivity to all MicroLogix controllers and most other Allen-Bradley controllers.

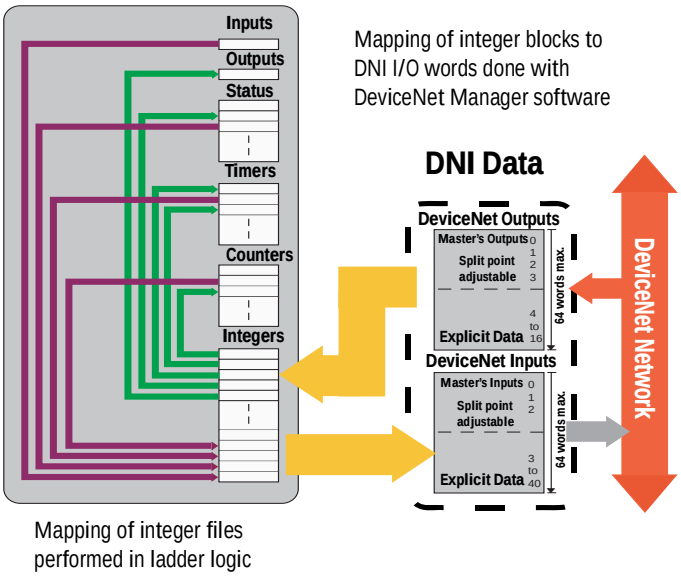
MicroLogix on DeviceNet lets you take advantage of the latest advances in communications. DeviceNet uses producer/consumer technology which significantly reduces the amount of traffic on the network, thus improving efficiency and data throughput. As a result, information gets across the network quicker.

Advanced Slave I/O Functionality

Through the DNI, MicroLogix controllers can function as cost-effective DeviceNet slave nodes. The DNI presents to DeviceNet up to 64 words of data (32 inputs, 32 outputs, configurable). The DNI can either poll or accept data sent from the MicroLogix controller to keep its mapped I/O data up-to-date with the actual data in the controller, while the DNI handles all DeviceNet communications.

All local I/O remains under the MicroLogix controller's direct control, yet can be visible to the DeviceNet master.

Using standard messaging commands, you can easily read or write data to other controllers as shown in the network diagram on page 18.



Simple, Reliable Peer-to-Peer Messaging

The DNI brings brand-new functionality to DeviceNet by enabling peer-to-peer messaging between devices that use the DF1 Full-Duplex protocol.

The DNI takes the DF1 Full-Duplex commands, wraps them in the DeviceNet protocol and sends them to the target DNI. The target DNI removes the DeviceNet information and passes the DF1 command to the end device.

This capability works between controllers, PCs and controllers, and for program up/downloading. I/O and data messages are prioritized, which minimizes I/O determinism problems typically encountered on networks that support I/O and messaging simultaneously.

Enable Your Control Strategy Now

Helpful information and free DNI configuration software are also available at http://www.ab.com/micrologix. For more on the DeviceNet standard, visit http://www.odva.org.

DeviceNet Interface Series B (1761-NET-DNI) Specifications

Description	Specifications
24V dc Power Source Requirements	11 to 25V dc
Current Draw	200 to 250 mA 400 mA maximum inrush current (30 msec, max.)
Internal Isolation	500V dc
Operating Ambient Temperature	0 to +60°C (+32 to +140°F)
Storage Temperature	-40 to +85°C (-40 to +175°F)
Agency Certification	UL 1604 C-UL C22.2 No. 213 Class 1, Division 2, Groups A, B, C, D CE compliant for all applicable directives ODVA conformance 2.0-A12
DeviceNet	maximum number of nodes = 64 maximum length = 500m at 125K baud or 100m at 500K baud

AIC+ Advanced Interface Converter

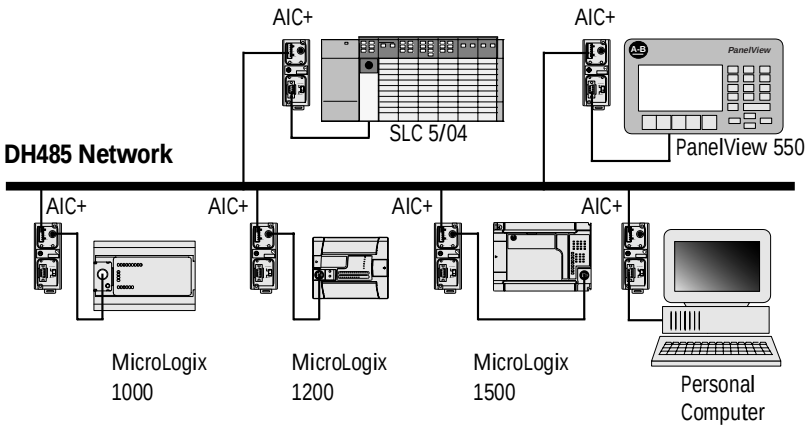
The AIC+ is a networking device from Allen-Bradley that provides DH485 network access from any DH485 compatible device that has a RS-232 port, including all MicroLogix controllers, SLC 5/03 and 5/04, and PanelView 550 and 900. In addition, the device provides isolation between all ports for a more stable network and protection for connected devices. The unit is DIN rail or panel mountable and is industrially hardened.

The Advanced Interface Converter provides a simple, cost-effective solution for connecting RS-232 devices to a DH485 network. The AIC+ also provides:

- Two isolated RS-232 connections - one 9-pin D-shell and one 8-pin mini DIN
- An RS-485 6-pin Phoenix connection
- Accepts power via the 8-pin mini DIN from a MicroLogix controller or an external power connection
- Compatibility with existing SLC DH485 networks that use 1747-AICs
- Auto baud rate capability for ease of system set-up
- Diagnostic LEDs for network activity

Some typical applications include:

- Connecting a personal computer to a DH485 network
- Connecting MicroLogix controllers to a DH485 network
- Linking SLC 5/03 or SLC 5/04 processors using DF1 Half-Duplex “master/slave” protocol. This allows you to connect remote “islands” of automation to a master controller to upload diagnostic and status information.



Advanced Interface Converter (1761-NET-AIC) Specifications

Description	Specifications
24V dc Power Source Requirement	20.4 - 28.8V dc
Current Draw	120 mA 200 mA maximum inrush current
Internal Isolation	500V dc
Operating Ambient Temperature	0 to +60°C (+32 to +140°F)
Storage Temperature	-40 to +85°C (-40 to +175°F)
Agency Certification	UL 1604 C-UL C22.2 No. 213 Class 1, Division 2, Groups A, B, C, D CE compliant for all applicable directives
DH485, DF1, or “user” Network	maximum number of nodes = 32 per multidrop network maximum length = 1,219m (4,000 ft.) per multidrop network maximum number of “ganged” multidrop networks = 2

High-Speed Functions

Features:

High-Speed Counters

- Two high-speed counters at 20 kHz feature eight modes of operation. Outputs can be controlled when counter reaches programmed high or low preset levels
- Programmable high and low presets, and overflow and underflow setpoints
- Automatic interrupt processing based on accumulated count

High-Speed Outputs

- Two 20 kHz, 32-bit outputs configurable as:
  - Pulse Train Outputs (PTO) with built-in trapezoid or S-curve profiles allow smooth acceleration and deceleration capability
  - Pulse Width Modulation outputs (PWM) with built-in trapezoid or S-curve profiles allow smooth acceleration and deceleration capability(1)

Latching (Pulse-Catch) Inputs

- Latching inputs allow very brief pulses to be captured and held for input scan processing

Selectable Timed Interrupts

- Selectable Timed Interrupts (STI) allow events to be scheduled independent of the program scan

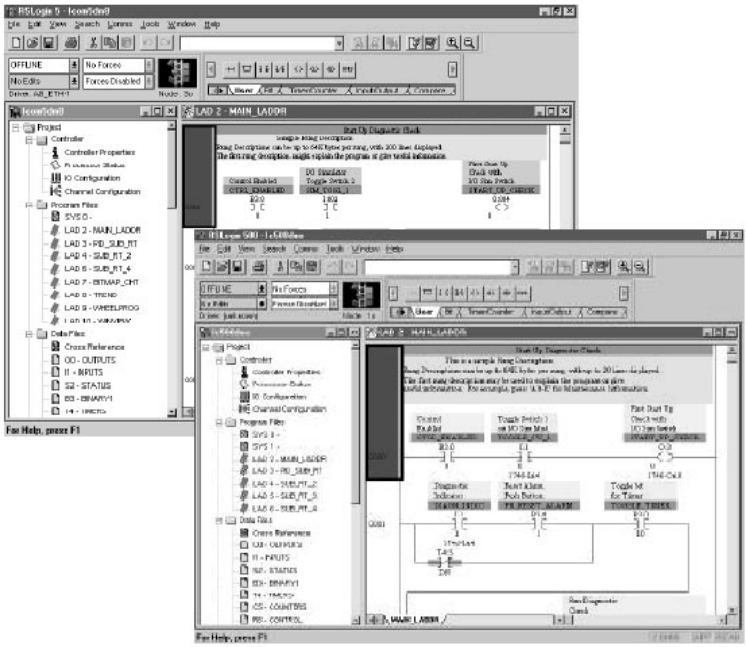
Event Interrupts

- Four event interrupts (EII) allow any of the eight high-speed inputs to be used as input interrupts
- 32-bit signed integer data (count range of ± 2,147,483,647)
- Run-time editable parameters (from the user control program)

(1) Planned availability in April 2000. Contact your local Rockwell Automation representative for information.

Programming Software

The following section describes programming options available for the MicroLogix 1500 controllers. With RSLogix 500 Programming Software, you can create, modify, and monitor application programs used by the MicroLogix 1000, MicroLogix 1200 and SLC Programmable Controller families.



RSLogix 500 Programming Software

The RSLogix 500 ladder logic programming package helps you maximize performance, save project development time, and improve productivity. This product has been developed to operate on Microsoft's 32-bit, Windows® 95, Windows® 98, and Windows NT™ operating systems. Supporting Allen-Bradley's MicroLogix families of processors and SLC 500, RSLogix 500 was the first PLC programming software to offer unbeatable productivity with an industry-leading user interface.

Flexible, Easy-to-Use Editors

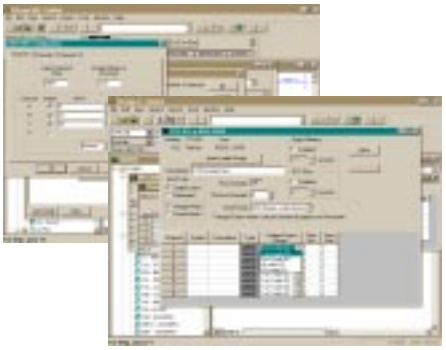
Flexible program editors let you create application programs without worrying about getting the syntax correct as you create your program. A *Project Verifier* builds a list of errors that you can navigate to make corrections at your convenience.

Drag-and-drop editing lets you quickly move or copy instructions from rung to rung within a project, rungs from one subroutine or project to another, or data table elements from one data file to another.

Context menus for common software tools are quickly accessible by clicking the right mouse button on addresses, symbols, instructions, rungs, or other application objects. This convenience provides you with all the necessary functionality to accomplish a task within a single menu.

Point-and-Click I/O Configuration

The easy-to-use I/O Configurator lets you click or drag-and-drop a module from an all-inclusive list to assign it a slot in your configuration. Advanced configuration, required for specialty and analog modules, is easily accessible. Convenient forms speed entry of configuration data. An I/O auto configuration feature is also available.



Point-and-Click I/O Configuration

Powerful Database Editor

Use the *Symbol Group Editor* to build and classify groups of symbols so that you can easily select portions of your recorded documentation to be used from project to project.

Use the *Symbol Picker* list to easily address instructions in your ladder logic by clicking addresses or symbols to assign them to your ladder instructions.

Powerful Database Editor

Diagnostics and Troubleshooting Tools

Simultaneously examine the status of bits, timers, counters, inputs, and outputs all in one window with the *Custom Data Monitor*. Each application project you create can have its own *Custom Data Monitor* window.

Easily review status bit settings specific to your application programming including *Scan Time* information, *Math Register* information, Interrupt settings and more with the tabbed *Status* displays.

Diagnostics and Troubleshooting Tool

Selection Chart

Catalog Number	Description
9324-RL0300ENE(1) (2)	RSLogix 500 Programming for the MicroLogix families and SLC 500 on CD-ROM. Includes RSLinx Lite.
9324-RL0100ENE(1) (2)	RSLogix 500 Starter Programming for the MicroLogix families and SLC 500 on CD-ROM. This package is a functionally limited version of RSLogix 500.
Programming Cables	See page 27 for information on programming cables.

(1) To use RSLogix 500 programming software, your system must be a Pentium 100 MHz or higher, Windows® 95, Windows® 98, or Windows NT™.
(2) Also available in French, German, Italian, Spanish and Portuguese.

Programming Instructions

The following table shows the MicroLogix 1500 instruction set listed within their functional groups.

The MicroLogix 1500's enhanced programming instructions feature the new data logging instruction which enables you to define controller variables that can be saved as a record. The elements of each record can be any mix of integer or double integer data (catalog number 1764-LRP)(1).

Functional Group	Description
Relay-Type (Bit)	The relay-type (bit) instructions monitor and control the status of bits. XIC, XIO, OTE, OTL, OTU, OSR, ONS, OSF
Timer and Counter	The timer and counter instructions control operations based on time or the number of events. TON, TOF, RTO, CTU, CTD, RES
Compare	The compare instructions compare values by using a specific compare operation. EQU, NEQ, LES, LEQ, GRT, GEQ, MEQ, LIM
Math	The math instructions perform arithmetic operations. ADD, SUB, MUL, DIV, NEG, CLR, SQR, SCL, SCP
Conversion	The conversion instructions multiplex and de-multiplex data and perform conversions between binary and decimal values. DCD, ENC, TOD, FRD
Logical	The logical instructions perform bit-wise logical operations on words. AND, OR, XOR, NOT
Move	The move instructions modify and move words. MOV, MVM
File	The file instructions perform operations on file data. COP, FLL, BSL, BSR, FFL, FFU, LFL, LFU
Sequencer	Sequencer instructions are used to control automatic assembly machines that have consistent and repeatable operations. SQC, SQO, SQL
Program Control	The program flow instructions change the flow of ladder program execution. JMP, LBL, JSR, SBR, RET, SUS, TND, MCR, END
Input and Output	The input and output instructions allow you to selectively update data without waiting for the input and output scans. IIM, IOM, REF
User Interrupt	The user interrupt instructions allow you to interrupt your program based on defined events. STS, INT, UID, UIE, UIF
Process Control	The process control instruction provides closed-loop control. PID
Communications	The communication instructions read or write data to another station. MSG, SVC
High-Speed Counter	The high-speed counter instructions configure, control and monitor the controller's hardware counter. HSL, RAC
High-Speed Outputs	The high-speed output instructions allow you to control and monitor the PTO and PWM functions which control the physical high-speed outputs. PTO, PWM
ASCII(1)	The ASCII instructions use the communication channel for receiving or transmitting data and manipulate string data. ACB, ACL, AHL, ARD, AEX, ACI, AIC, SWP, AWT, AWA, ASC, ASR
Data Log	The data log instruction allows you to define variables and record their values. DLG

(1) Planned availability in April 2000. Contact your local Rockwell Automation representative for information.

Operator Interface Devices

Operator interface devices provide you with powerful plant floor control and data monitoring capabilities.

MicroView™ Operator Interface

The MicroView Operator Interface is a feature-packed, cost-effective operator interface designed for data monitoring, data display, data entry, and recipe download. This device features a 2-line x 16-character display window.

DTAM™ Micro Operator Interface

The DTAM Micro Operator interface provides another operator interface to the MicroLogix line. DTAM Micro is a low-cost operator interface. This device features a 2-line x 20-character display window. Up to 244 application screens can be stored in memory. This device features a 2-line x 16-character display window.

DTAM Plus Operator Interface

The DTAM Plus Operator Interface provides a highly functional operator interface for the MicroLogix 1500 family of processors. This device features a 4-line x 20-character display window for viewing data table information and operator prompts. Display screens are created using an Offline Development software Package.

PanelView™ Operator Terminals

PanelView Operator Terminals provide operator interface capabilities in space saving, flat panel designs or 14-inch CRTs. These electronic operator interfaces feature pixel graphics and high-performance functionality in color and monochrome flat panel displays, as well as Super VGA CRTs with optimum viewing angles and resolution. PanelView terminals provide extensive diagnostic information to operators during fault conditions through message windows, alarm windows, and simple graphics.

Accessories

Data Access Tool (1764-DAT)

- Direct access to 48 bit elements
- Direct access to 48 integer elements
- Two function keys
- Display of controller faults
- Removal/Insertion under power

Real-Time Clock (1764-RTC)

- Availability allows for time/date scheduling applications to be easily solved.

Memory Modules (1764-MM1, -MM2, -MM1RTC, -MM2RTC)

- Availability allows for time/date scheduling applications to be easily solved.
- Memory backup and real-time clock/memory module
- User Program and Data Back-up
- Program Compare
- Data File Protection
- Memory Module Write Protection
- Removal/Insertion Under Power

Several modules with different levels of functionality are available for use with the MicroLogix 1500 controller.

Catalog Number	Function	Memory
1764-RTC	Real-Time Clock	Not Applicable
1764-MM1	Memory Module	8K
1764-MM2(1)	Memory Module	16K
1764-MM1RTC	Memory Module and Real-Time Clock	8K
1764-MM2RTC(1)	Memory Module and Real-Time Clock	16K

(1) Planned availability in April 2000. Contact your local Rockwell Automation representative for information.

Cables

Use the communication cables listed below with the MicroLogix 1500 controllers. Cables come in several lengths and connector styles to provide connectivity to the MicroLogix family of products.

Catalog Number	Cable Type	Description
1761-CBL-AC00	9-pin D-shell to 9-pin D-shell	This 45 cm (17.7 in.) cable is used to connect port 1 of the 1761-NET-AIC to the 9-Pin DTE port of a personal computer.
1747-CP3	9-pin D-shell to 9-pin D-shell	This 3m (9.8 ft) cable is used to connect port 1 of the 1761-NET-AIC to the 9-Pin DTE port of a personal computer.
1761-CBL-AM00	8-pin DIN to 8-pin DIN	This 45 cm (17.7 in.) cable is used to connect the MicroLogix controller to port 2 of the 1761-NET-AIC
1761-CBL-HM02	8-pin DIN to 8-pin DIN	This 2m (6.56 ft) cable is used to connect the MicroLogix 1500 Programmable Controller to the HHP or to connect any MicroLogix Programmable Controller to port 2 of the 1761-NET-AIC
1761-CBL-AP00	9-pin D-shell to 8-pin DIN	This 45cm (17.7 in.) cable is used to connect a MicroLogix controller to port 1 of the 1761-NET-AIC.
1761-CBL-PM02	9-pin D-shell to 8-pin DIN	This 2m (6.56 ft) cable is used to connect the MicroLogix Programmable Controller to an IBM compatible PC or to connect an IBM compatible PC to port 2 of the 1761-NET-AIC
Compact I/O Expansion Cables		
1769-CRR1	This 305 mm (1 ft.) right bank-to-right bank cable is used to add a second bank of I/O modules.	
1769-CRR3	This 1 m (3.28 ft.) right bank-to-right bank is used to add a second bank of I/O modules.	
1769-CRL1	This 305 mm (1 ft.) right bank-to-left bank is used to add a second bank of I/O modules.	
1769-CRL3	This 1 m (3.28 ft.) right bank-to-left bank cable is used to add a second bank of I/O modules.	

User Documentation

For an introduction to micro PLC's refer to the MicroMentor™, Publication 1761-MMB. The MicroMentor book includes illustrations, sample applications you can put to immediate use, step-by-step strategies, and worksheets.

Additionally, MicroLogix 1500 user documentation presents information according to the tasks you perform and the programming environment you use. Refer to the table below for information on MicroLogix 1500, 1769 Compact I/O and related publications.

See this Document	Publication Number
MicroLogix™ 1500 Programmable Controllers Installation Instructions	1764-5.1
MicroLogix™ 1500 Programmable Controllers User Manual	1764-6.1 (Feb. 1999) 1764-UM001A-US-P(1)
MicroLogix™ 1200 and MicroLogix™ 1500 Instruction Set Reference Manual	1762-RM001A-US-P(1)
Bulletin 1769 Compact™ I/O Analog Input/Output Modules	1769-1.2
1769 Compact™ Discrete Input/Output Modules Technical Data	1769-2.1
1769 Compact™ I/O Power Supplies and Communication Bus Expansion Cables Technical Data	1769-TD001A-US-P
Compact™ I/O Analog Modules User Manual	1769-6.0
AIC+ Advanced Interface Converter and DeviceNet Interface Installation instructions	1761-5.11
AIC+ Advanced Interface Converter User Manual	1761-6.4
DeviceNet™ Interface User Manual	1761-6.5
DTAM™ Micro Operator Interface Module User Manual	2707-803
MicroView™ Operator Interface Module User Manual	2707-805
DataDisc™ CD-ROM Information Library	1795-CDRS and 1795-CDRL

(1) Updated manual containing 1764-LRP processor and MicroLogix 1500 enhanced functionality information available in April 2000.

For assistance selecting the correct MicroLogix Programmable Controller for your application, see the MicroLogix selector guide on the back of this publication. If you would like a system overview for the MicroLogix 1000 or MicroLogix 1200 controllers, refer to the following table.

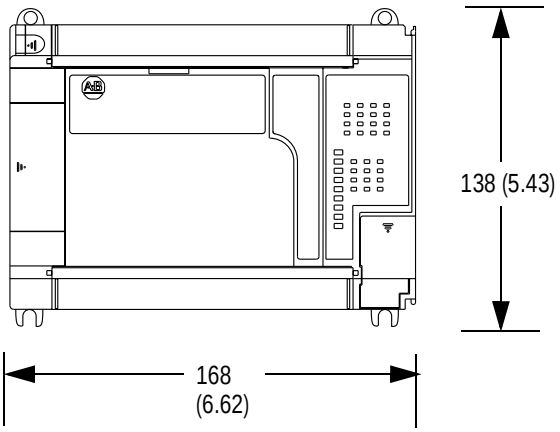
See this Document	Publication Number
MicroLogix™ 1000 System Overview	1761-SO001A-US-P
MicroLogix™ 1200 System Overview	1762-SO001A-US-P

To purchase a manual or download a free electronic version, visit us at http://www.theautomation bookstore.com. Or, for fast access to Bulletin 1761, 1762, and 1764 publications, visit the MicroLogix Internet site http://www.ab.com/micrologix. Electronic versions of our manuals are available for you to search and download.

Dimensions

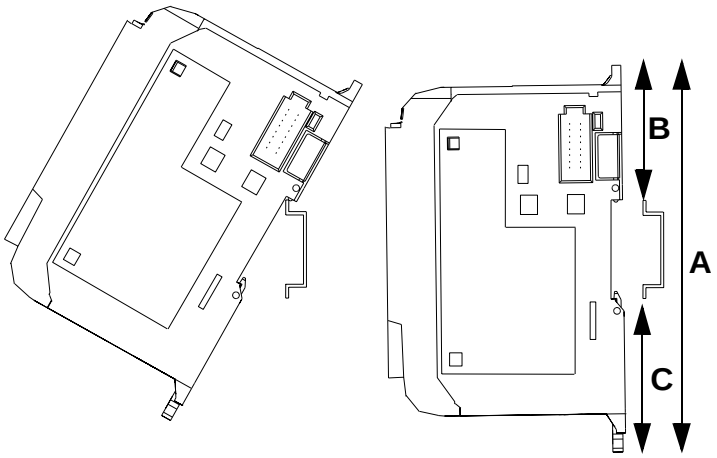
Dimension Drawings

1764-24AWA, -24BWA, -28BXB



Front View

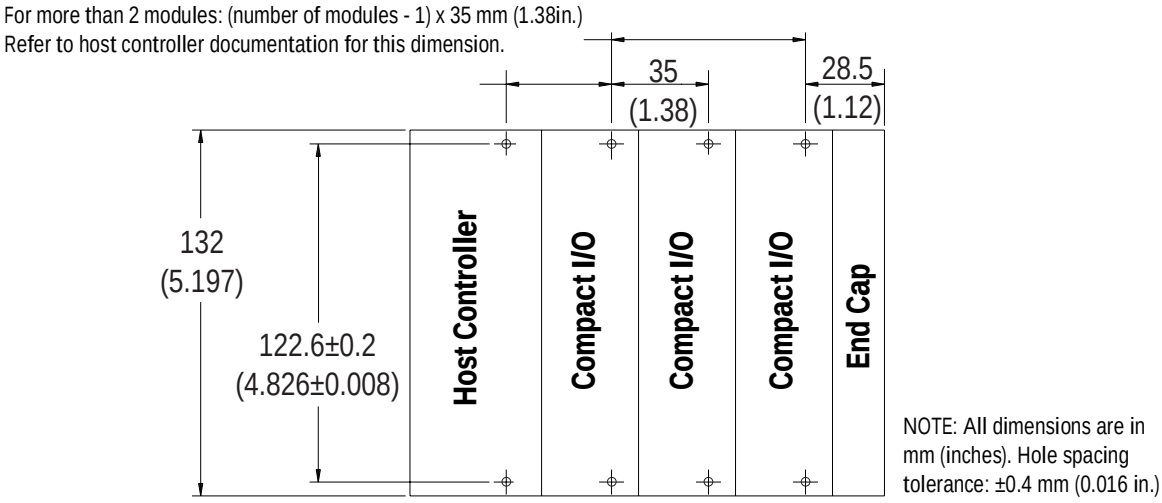
MicroLogix 1500 DIN Rail Dimensions



Side View

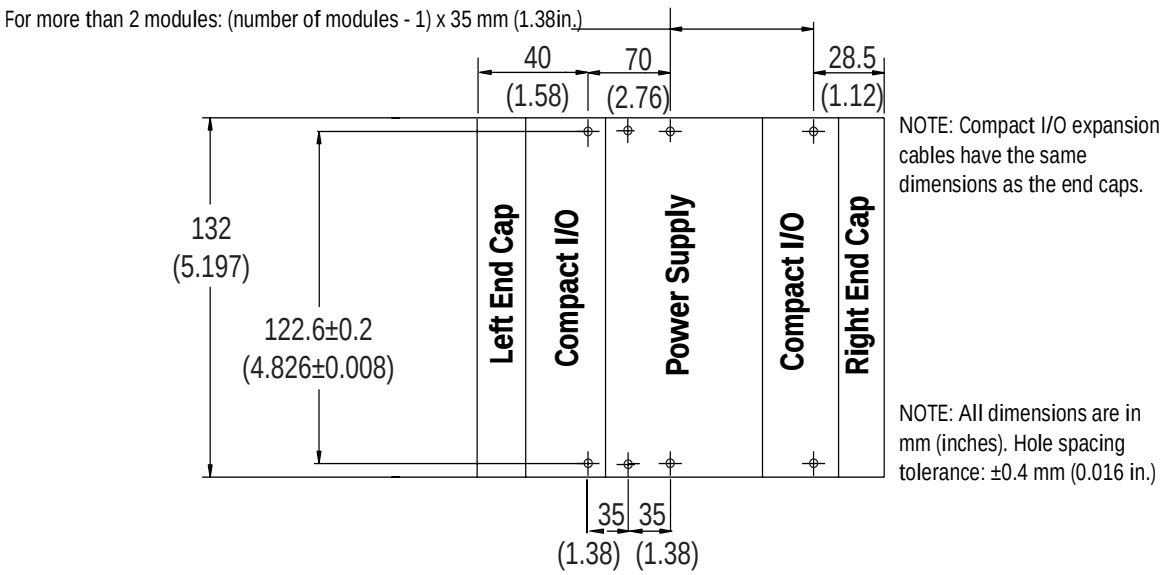
Dimension	Height
A	138 mm (5.43 in.)
B	47.6 mm (1.875 in.)
C	47.6 mm (1.875 in) DIN latch closed 54.7 mm (2.16 in.) DIN latch open

Compact I/O Modular Input/Output System



NOTE: All dimensions are in mm (inches). Hole spacing tolerance: ±0.4 mm (0.016 in.)

Compact I/O Expansion Power Supply and End Caps



NOTE: Compact I/O expansion cables have the same dimensions as the end caps.

NOTE: All dimensions are in mm (inches). Hole spacing tolerance: ±0.4 mm (0.016 in.)

	MicroLogix 1000	MicroLogix 1200	MicroLogix 1500	
	1761	1762†	1764-LSP	1764-LRP†
Memory				
Up to 1K	•			
Up to 6K		•		
Up to 7K			•	
Up to 12K				•
EEPROM Back-up	•	•		
Battery Back-up			•	•
Back-up Memory Module		•	•	•
I/O				
Up to 32	•			
Up to 88 (using 1762 I/O)		•		
Up to 156 (using 1769 I/O)			•	•
Added Functionality				
Analog (Embedded)	•			
Analog (Expansion)		•	•	•
Trim Potentiometers		2	2	2
PID		•	•	•
High Speed Counters	1	1	2	2
Real Time Clock		•	•	•
Motion Capabilities (Pulse Width Modulated and Pulse Train Outputs)		1 *	2	2
Data Access Tool			•	•
Data Logging (50k bytes)				•
Programming Software				
Windows - RSLogix 500	•	•	•	•
DOS - A.I. 500	•			
Communications				
RS-232 Ports	1	1	1	2
DeviceNet (1761-NET-DNI)	•	•	•	•
DH485 (1761-NET-AIC)	•	•	•	•
SCADA RTU - DF1 Half-Duplex Slave	•	•	•	•
SCADA RTU - Modbus RTU Slave		•	•	•
ASCII - Write only		•		
ASCII - Read/Write			•	•
Operating Power				
120/240V ac	•	•	•	•
24V dc	•	•*	•	•
UL, CSA or C-UL, CE, Class I Div.2	•	•	•	•

Compact, DF1, MicroLogix and RSLogix 500 are trademarks of Rockwell Automation.
DeviceNet is a trademark of Open DeviceNet Vendor Association.
Ethernet is a registered trademark of Digital Equipment Corporation, Intel and Xerox Corporation.
ControlNet is a trademark of ControlNet International, Ltd.

Americas Headquarters, 1201 South Second Street, Milwaukee, WI 53204, USA, Tel: (1) 414 382-2000, Fax: (1) 414 382-4444
European Headquarters SA/NV, avenue Herrmann Debroux, 46, 1160 Brussels, Belgium, Tel: (32) 2 663 06 00, Fax: (32) 2 663 06 40
Asia Pacific Headquarters, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 1764-SO001A-U-P — December 1999

© 1999 Rockwell International Corporation. All rights reserved. Printed in USA.